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ELDORADO

Annual Report 1964

Eldorado Mining and Refining Limited
and Subsidiaries

Northern Transportation Company Limited
Eldorado Aviation Limited

Eldorado Mining and Refining Limited

Head Office: 150 Kent Street, Ottawa, Canada
Postal Address: P.O. Box 379, Ottawa, Canada
General Administration Office: Port Hope, Ontario, Canada

DIRECTORS

W. J. Bennett W. M. Gilchrist* F. R. Hadley W. F. James*
Gordon Lawson* J. E. Sydie W. G. Thompson

*Members of Executive Committee

OFFICERS

President: W. M. Gilchrist
Vice-President, Mining and Exploration: H. E. Lake
Vice-President, Refining: J. C. Burger
Vice-President, Administration and Finance: D. G. Scott
Secretary: R. C. Powell Treasurer: J. C. Orr

MANAGERS

Beaverlodge Operation: A. R. Allen Refinery: R. M. Berry
Research and Development: A. Thunaes

DISTRICT OFFICES

Refining and Sales: Port Hope, Ontario Beaverlodge Mine: Eldorado, Saskatchewan
Metallurgical Laboratories: Tunney's Pasture, Ottawa, Canada
Vice-President, Mining and Exploration: 10040 - 105th Street, Edmonton, Alberta
Western Purchasing and Employment Office: 10040 - 105th Street, Edmonton, Alberta

NORTHERN TRANSPORTATION COMPANY LIMITED

HEAD OFFICE: 150 Kent Street, Ottawa, Canada
OPERATIONS OFFICE: 10040 - 105th Street, Edmonton, Alta.

DIRECTORS

W. J. Bennett A. B. Caywood W. M. Gilchrist
W. B. Hunter H. E. Lake P. L. P. Macdonnell

OFFICERS

President: W. M. Gilchrist
Vice-President: H. E. Lake
General Manager: W. B. Hunter
Secretary: R. C. Powell Treasurer: J. C. Orr

ELDORADO AVIATION LIMITED

HEAD OFFICE: 150 Kent Street, Ottawa, Canada
OPERATIONS OFFICE: No. 11 Hangar, Municipal Airport,
Edmonton, Alberta

DIRECTORS

W. J. Bennett A. B. Caywood W. M. Gilchrist
H. E. Lake P. L. P. Macdonnell

OFFICERS

President: A. B. Caywood
Secretary: R. C. Powell Treasurer: J. C. Orr

Eldorado Mining and Refining Limited Sales Agencies Abroad

Europe excluding Great Britain: N.V. Internationale Ertshandel "Wambersie", P.O. Box 1439, Calandstraat 7a, Rotterdam, Netherlands
Japan: Marubeni-Iida Co. Ltd., P.O. Box Central 595, Tokyo

Annual Report 1964

Eldorado Mining and Refining Limited *and subsidiaries*
Northern Transportation Company Limited • Eldorado Aviation Limited

President's Letter

The Honourable Mitchell Sharp,
Minister of Trade and Commerce,
Ottawa, Canada

Sir:

On behalf of the Board of Directors, and in accordance with Section 85(3) of The Financial Administration Act, I have the honour to submit the Annual Report of Eldorado Mining and Refining Limited and its subsidiary companies, Eldorado Aviation Limited and Northern Transportation Company Limited, for the year ended December 31, 1964.

With the completion of contracts by several mines, the sales of uranium in Canada dropped in 1964 to the lowest level since 1956. There has been a steady downward trend for five consecutive years.

Total industry sales in 1964 of 11,259,229 pounds of uranium oxides, valued at \$76,298,692, were 26 per cent less in volume and 45 per cent less in value than those of 1963, which amounted to 15,216,812 pounds at \$139,900,174. The 1964 volume was equal to only 36 per cent of the 30,996,065 pounds sold in the peak year 1959, and the value represented only 23 per cent of the 1959 high mark of \$325,328,282.

The diminishing production in recent years has been generally in line with the predictable pattern shaped by the stretch-out policy, the allocation of the 12,000-ton

contract with the United Kingdom Atomic Energy Authority, and the Canadian Government stockpiling program.

At the end of 1964, there were but four active producers in the Canadian uranium mining industry, which at its peak in 1959, comprised 25 mines with an annual aggregate output exceeding in value that of any other metal mined in this country.

Three mines ceased operation last year. The mine of Gunnar Mining Limited in the Lake Athabasca region, which, in almost twelve years of productive life, had produced 17,900,000 pounds U_3O_8 for a gross return of more than \$147,000,000, exhausted its ore body and discontinued operations in February. At that time 1,200,000 pounds of uranium oxides remained undelivered by Gunnar under the United Kingdom contract. Eldorado was directed by the Government to invite tenders from producers in the Elliot Lake and Bancroft areas for the supply of this poundage, the deciding factor to be the man-days of employment to be provided. Denison Mines Limited was the successful bidder and will maintain production until July, 1965.

The Milliken mine of Rio Algom Mines at Elliot Lake, and the Bancroft Division of Metal Mines Limited (formerly Faraday) at Bancroft, ceased operations in June.

The producers still active are Denison, Rio Algom Nordic, and Stanrock mines at Elliot Lake, and Eldorado's Beaverlodge operation. Under existing contracts, Eldorado will continue production until early 1967 and Rio Algom will carry on until 1971.

Late last year, Stanrock Uranium Mines halted conventional mining because of reduced uranium content of its ore, and converted to bacterial leaching as a means to produce enough uranium to fulfil its contract. It will produce by this method until the first quarter of 1966.

While the foregoing paragraphs outline the state of



W. M. GILCHRIST

the industry at this writing, on the basis of firm contracts in effect, the prospects for the future have been brightened immeasurably by recent developments.

A year ago it was generally believed in the industry that a gradual resurgence of demand probably would not begin until the late 1960's or the early 1970's. This view has changed. It now appears that a renewal of

demand already is on our doorstep, and that the quantities involved and the probable urgencies of delivery are much greater than had been contemplated.

There have been a number of inquiries from abroad and some preliminary negotiations on the purchase of large quantities of Canadian uranium. France has shown particular interest, and a number of other European countries have indicated a desire to purchase appreciable quantities of Canadian uranium.

No new contracts have been signed to date, but it is clear that negotiations are moving ahead. The amounts of uranium involved are substantial. If all of the inquiries were to result in actual contracts, their fulfilment would for some years to come take a major part of the output of the mines that are still in production.

This significant change in the picture is attributable to the great strides that have been made in efficiency and the economics of nuclear power generation. There are few lingering doubts as to the feasibility of the nuclear reactor as a competitive source of electrical energy.

This has brought about an entirely different concept of uranium. Since the initiation of the Manhattan Pro-

ject during World War II, and perhaps more especially, when the urgencies of the cold war threat caused our Canadian uranium mining industry to attain the giant stature of the late 1950's, uranium has been thought of mainly as a metal, or as chemical compounds of the metal, vital only to the defence capabilities of the western nations. That role has receded. It is generally accepted that stockpiles of fissionable materials for weaponry are adequate for foreseeable needs.

Now uranium may be looked upon as a symbol of progress and a boon to mankind. The world needs it as fuel for the generation of very large quantities of electrical energy for use in peaceful pursuits and the advancement of humanity.

Canada's reserves of uranium are greater than those of any other western country, representing about 35 per cent of all known reserves of the western world. The nation's position is not only one of opportunity, but also one of great responsibility.

As recently as a year ago, our principal worry was how to stimulate enough demand to keep even a few of our uranium mines alive throughout what we thought of as "the waiting period". Today, very considerable and quite insistent demands are shaping up for the future, and our thoughts are turning towards the possibility of a shortage of supply in the not-too-distant future.

While Canada does indeed have a great deal of uranium in proportion to the reserves of other western countries, our known supply is by no means inexhaustible. It is estimated that Canada has about 200,000 tons of uranium that could be mined profitably at prices not in excess of \$10 per pound. In addition, some 200,000 tons could be recovered at prices up to \$20 per pound. In this connection, it should be remembered that of the 25 Canadian mines that were active in the industry's peak year of 1959, fewer than a dozen could be operated profitably at a price of \$10.50 per pound. These are the known resources, but intensive prospecting and development could, in the space of a few years, materially expand these figures as the occurrence of uranium in economic concentrations is geologically possible in many areas of the Canadian Shield.

The significance of Canada's known reserves comes into clearer focus when related to the proven reserves of the western world. A report, presented at the Geneva Conference last September, placed the western world reserve, as of January 1, 1964, at 589,000 tons of uranium. It was predicted this total would drop to 474,000 tons by 1971.

An earlier report, issued by the European Atomic Energy Community in 1963, stated that 630,000 tons of uranium had been discovered since World War II, with no major find reported since 1956. Euratom said that with the rapid development of nuclear reactors, as much as 200,000 tons of uranium would be used in the ten years following 1970, and that annual consumption in 1980 would be four times that of 1970. Euratom forecast that known reserves of the United States would be depleted before 1980, leaving the western nations almost wholly dependent upon Canadian and South African sources.

A year ago there was agreement among the experts that annual uranium needs for power generation in the western countries would amount to 12,000 tons in 1970; 25,000 to 28,000 tons in 1975; and 35,000 to 50,000 tons in 1980. There has been a sharp upward revision of the figures for the later years in light of accelerated construction and planning of new nuclear reactors. The latest estimate of the United States Atomic Energy Commission predicts a potential consumption of up to 60,000 tons of uranium for power generation in the western world by 1980.

There are firm contracts now in effect which will require a production in 1970 of about 8,000 tons of uranium in the United States; 1,500 tons in South Africa; 1,200 tons in Canada, and perhaps 1,500 tons in other western countries combined. Thus, without taking into account any possible new requirement for military use, for nuclear propulsion of commercial ships, or other needs, there would be an approximate balance in 1970 between production and consumption.

A rapidly rising demand from 1970 onwards seems inevitable, with the rate of consumption of uranium fuel in 1975 more than double that of 1970, and in 1980 about five times that of 1970. This means that in the late 1970's consumption will surpass the peak annual output attained by the uranium mines of the western world in the boom years of the 1950's.

These are sobering predictions made by well-qualified people. They strongly substantiate the widely-held belief that early in the 1970's there will be a developing world shortage of what might be termed "cheap" uranium. The nations now knocking on our door are eager to assure themselves of supplies of uranium at what may be considered bargain prices a few years hence.

It seems probable that so far we may have heard only from the advance guard of nations that will be anxious to buy uranium from Canada. There are not many suppliers in the marketplace, and the number of possible customers is relatively large.

1964 Annual Report in Capsule Form

	1964	1963
<i>Sales</i>	\$15,690,356	\$24,280,962
<i>Net Income</i>	\$ 2,450,490	\$ 2,782,888
<i>Taxes (Federal, Provincial, and Municipal)</i>	\$ 3,164,744	\$ 3,412,854
<i>Dividends</i>	\$ 1,500,000	\$ 2,000,000
<i>Expenditures for land, buildings and equipment</i>	\$ 1,715,575	\$ 594,820
<i>Mine ore treated —</i>		
<i>Beaverlodge (tons)</i>	522,148	544,177
<i>U₃O₈ produced —</i>		
<i>Beverlodge (pounds)</i>	1,837,029	1,855,212
<i>Number of employees at end of year</i>	790	776
<i>Wages and salaries paid</i>	\$ 5,590,053	\$ 5,669,325

The assumption is that the United States will be able to satisfy her national requirements from her own resources until the mid-1970's. However, the known reserves of the United States are not great, and defence and other considerations may dictate policies of conservation.

South Africa produces uranium as a by-product of gold mining. The grade is low and an annual production of more than 5,000 to 6,000 tons is unlikely at the prices forseen for most of the 1970's.

France may be expected to keep her uranium resources for domestic needs. The known reserves of other western countries are relatively insignificant.

It is obvious why much of the western demand will eventually bear upon Canada. So far, virtually all the uranium produced in Canada has been sold to the United States and the United Kingdom, but now other countries such as France, West Germany and Japan are becoming important markets. Canada herself is taking a leading position in the nuclear power field, and reactors already under construction or on the drawing boards will require significant tonnages of fuel within a very few years.

Canada's situation in respect of uranium is not the same as her position with respect to other metals. Our position is unique because we have better than one-third of the known reserves of the western world, and because circumstances peculiar to other countries with resources of uranium limit their capacity to deliver to world markets.

There are national and international aspects of the position which warrant careful consideration. Opportunities will arise which, if skilfully exploited, will be richly rewarding to both the nation and the industry.

It is to be hoped that the resurgence of demand will stimulate widespread and effective prospecting. Not a single significant discovery of uranium has been reported in Canada since 1956. There is little evidence that any major Canadian mining company has been seriously looking for uranium. As far as Eldorado is aware, the only exploration for uranium currently underway in Canada is being carried on by a large French mining company, through a Canadian subsidiary. This company has staked a considerable acreage in the Beaverlodge area and also has a mineral concession in Labrador.

It may be argued that present prices for uranium provide insufficient incentive to prospectors and developers. This may be true if one takes only the short view, but the demand taking shape for the long term is of such magnitude that the price levels must rise in the 1970's and the 1980's. The fuel factor is relatively such a small element in the cost of nuclear power that after reserves of high-grade uranium have been depleted, \$20 per pound may well be considered a reasonable price.

Uranium has made an enormous contribution to the national economy in the past decade, and there is every indication that it will continue to do so. In the ten years 1955 — 1964, sales of Canadian uranium to the United States Atomic Energy Commission and the United Kingdom Atomic Energy Authority reached a grand total of \$1,656,000,000.

On January 28, 1965, Eldorado Mining and Refining Limited began its 21st year as a Crown corporation. The Government's original investment in acquiring ownership of the Company was \$9,246,877, from which it has derived \$32,240,000 in dividends and redemption of shares. In addition, over the 20-year period the Company has paid, or provided for, Federal income taxes of \$29,303,000; royalties to the Saskatchewan Government

amounting to \$4,057,000, and \$2,760,000 in grants to municipalities in lieu of property taxes: an aggregate of royalty and tax payments of \$36,120,000. After these charges, the balance sheet of the Company still records a net worth of \$52,000,000.

The financial results of Eldorado Mining and Refining Limited were, of course, again affected in 1964 by the continuing decline in uranium sales. Sales income of \$15,690,356 was down by \$8,590,606 from that of 1963. Net profit of \$2,450,490 compared with \$2,782,888 in 1963.

Northern Transportation Company Limited, the wholly-owned subsidiary which provides freighting service throughout the Mackenzie Basin and along the Western Arctic coast, had another successful year. Tonnages carried and revenues earned were enhanced by the extensive oil drilling activities in the North. During the year a contract was awarded to a West Coast shipyard for a 225-foot vessel of special design for service along the Arctic Coast from Alaska to the Boothia Peninsula. It is scheduled for delivery in May.

Operations of the other subsidiary, Eldorado Aviation Limited, were curtailed somewhat by the reduction of freight shipments to the Company's Beaverlodge Operation.

Your Board of Directors again records its warm gratitude for the continuing loyalty and effort of employees of the Company and its subsidiaries.

For the Directors,

W. M. Gilsburt

President

Ottawa, Canada
February 25, 1965

For the Year Ended Dec. 31, 1964 **General Report**

Eldorado Mining and Refining Limited

and its wholly-owned subsidiaries

Northern Transportation Company Limited • Eldorado Aviation Limited

This General Report includes comments upon the operations of Eldorado Mining and Refining Limited and its wholly-owned subsidiaries, Northern Transportation Company Limited and Eldorado Aviation Limited, for the year ended December 31, 1964.

Income

Operations during the year under review continued to produce substantial earnings despite the decline in sales volume. Net profit was \$2,450,490 after provision of \$2,804,150 for income taxes and provincial royalties, compared with 1963 profit of \$2,782,888 after providing \$3,135,200 for income taxes and royalties.

It will be recalled that in October, 1962, Eldorado commenced the financing of uranium procurement under the 12,000-ton contract with the United Kingdom. Income arising from this source rose from \$1,254,629 in 1963 to \$2,974,085 in 1964 as the program expanded and contributed importantly to earnings. Interest and other non-operating income of \$690,605 in 1964 was \$523,970 below that of the previous year because increased involvement in financing the British contract left less funds available for investment and yields were lower.

The 1964 sales volume of \$15,690,356 represented a 35 per cent decline from the 1963 volume. This downward trend adversely affected unit costs and profits, and reflected the stretch-out of deliveries which was in effect at the Port Hope refinery during the entire year.

Taxes

The Company, although wholly-owned by the Crown, is subject to the usual taxes imposed upon private corporations such as income tax, sales tax and mining

tax. Grants in lieu, equivalent to taxes at current rates, are paid to municipalities where the Company's properties are located. The municipalities of Uranium City, Port Hope, Ottawa and Edmonton received a total of \$360,598 in such grants during 1964 as compared with \$277,658 in 1963.

Dividends

A dividend of \$1,500,000 was paid by the Company to the Receiver General on December 18, 1964, being \$500,000 less than in 1963. The total remitted to the Government in dividends and redemption of shares has amounted to \$32,240,000 since the ownership of Eldorado Mining and Refining Limited was acquired by the Crown in 1944.

Capital Expenditures

Outlays for new plant and equipment amounted to \$1,715,575 during the year. The major projects undertaken were at the Beaverlodge mine and included expenditure of \$955,700 for the installation of a new autogenous grinding facility, and \$142,915 for construction of a plant to produce oxygen for the leaching process. Additional production and laboratory equipment was installed at the refinery and the research laboratories at a total cost of \$310,200.

Mine Operations

Production from the Beaverlodge mine was 1,837,029 pounds U_3O_8 recovered from 522,148 tons of ore. Operating cost per pound U_3O_8 increased by four per cent as a result of reduced throughput and the effect of

increased development expense, surface geological work, and the rise in municipal taxes and freight costs.

Comparative production statistics, excluding custom ore treated, are:

	<i>Tons of Ore Treated</i>	<i>Pounds U₃O₈ Recovered</i>	<i>Average Recovery Pounds per Ton</i>
1964	522,148	1,837,029	3.52
1963	544,177	1,855,212	3.41
1962	563,580	1,959,788	3.48
1961	542,157	2,214,894	4.09
1960	625,127	2,454,400	3.93
1959	657,521	2,392,770	3.64
1958	676,354	2,507,663	3.71
1953-64 incl.	5,337,373	20,293,021	3.80

Mine development objectives were met or surpassed and continued improvement was achieved in productivity. A comparison of yearly development statistics for the period 1962 — 1964, together with cumulative totals from the beginning of operations to December 31, 1964, follows:

<i>(in feet)</i>	<i>1962</i>	<i>1963</i>	<i>1964</i>	<i>Cumulative Totals</i>
Shaft-sinking	393	—	—	7,126
Drifting and cross-cutting	9,220	18,456	17,708	227,440
Raising	8,127	7,221	5,071	77,169
Diamond drilling (underground)	76,129	75,708	108,423	971,485
Sludge drilling	10,134	4,697	1,919	113,392

Proved, probable and pillar ore reserves at year-end totalled 1,500,000 tons grading 0.21 per cent U₃O₈ compared with 1,466,400 tons grading 0.22 per cent at the end of 1963. Diamond drilling and development work on the downward extension of the Verna ore bodies were not sufficiently advanced to justify additions to the ore reserves. However, reserves should show a marked increase by year-end 1965.

Lateral development continued throughout the year on the three winze levels in preparation for stoping. Exploration and lateral development were extended in the lower Fay area, with work on the 19th level proceeding on a three-shift basis in order to be in position early in 1965 to deepen the internal winze by 920 feet. Mining in the West Fay ore bodies was carried on throughout the year with tonnages exceeding expectations from early development work.

Development of the lower Fay levels will continue in 1965 so that the downward projection of the main ore body can be drilled on the 21st and 24th levels by year-end. Engineering studies and recommendations resulted in further improvements in crew productivity and mine safety through the use of ammonium nitrate blasting, Long-Tom drill jumbos for development headings, resin grouting of rock bolts in difficult ground, and specially treated burlap for backfill retention.

Milling operations and costs were well maintained in spite of interruptions caused by the installation of the 19-foot autogenous grinding mill to replace present crushing and grinding facilities. The new mill will commence operations early in 1965. Installation of an oxygen plant and precipitate calciner was undertaken during the latter part of the year with both projects due to commence operations in the Spring of 1965. In addition, the chemical laboratory facilities were being re-located in the mill — another project nearing completion at year-end.

Capital expenditures planned for 1965 cover the installation of a new crusher underground, the purchase and installation of a mine exhaust fan, and miscellaneous equipment for the mine and the mill.

Refinery Operations

The solvent extraction circuit for the production of UO₃ was operated at 25 per cent of capacity for 32 weeks which was sufficient to meet contract commitments for the year 1964 to the United States Atomic Energy Commission. The present rate of throughput for two more years will complete scheduled deliveries to the Commission. During the year, plant scale tests for the recovery of cobalt, silver, nickel and arsenic from complex feeds utilized the solvent extraction circuit on four different occasions for a total operating time of 17 weeks.

The Canadian Government's stockpiling program which commenced in 1963 was completed during the year. Concentrates containing 2,683 tons of U₃O₈ were received, weighed, sampled, assayed and stored in the warehouse.

The demand for ceramic grade uranium oxide amounted to 46,273 pounds UO₂. Although production was intermittent, both quality and sinterability remained excellent, giving promise of broad acceptance in the emerging reactor fuel market.

Further knowledge and experience were gained in the production of both low and high enrichments of ceramic oxide. The bulk of the production was for the White-

shell Nuclear Research Reactor WR-1 being built by Atomic Energy of Canada Limited, and lesser amounts for other fuel development programs. In-plant development work was related to the processing of UO_2 scrap, uranium-aluminum alloy scrap, and to the start-up of the low enrichment circuit.

The green salt plant, formerly used for converting UO_3 to uranium tetrafluoride, was reactivated for pilot plant tests on new product development. The tests were conducted on hafnium-free hydrated zirconium oxide for the recovery of zirconium. This work was carried on in conjunction with the Research and Development Division.

In the metal reduction section a stock of depleted uranium metal was produced from depleted uranium tetrafluoride. The metal was used for a number of special castings for radiation shielding and other purposes. In addition, several hundred enriched uranium aluminum billets were cast for A. E. C. L. A new induction furnace was installed in 1964 to provide faster heat-up and turn-around times in research programs on small specialized castings.

Development of techniques for the production of uranium carbide fuel slugs under contract to A. E. C. L. was continued. Samples of cast uranium carbide rods, shipped to the United States for evaluation, have placed Eldorado in the position of an accredited supplier.

During the year a total of 28,312 analytical, spectrographic, and metallographic determinations were made. A new direct-reading emission spectrograph was installed to obtain faster analyses.

Sales

The Company's principal sales efforts are being directed at supplying fuel and other products required in the development of nuclear power. During 1964, Company representatives visited several European countries and Japan, as well as the United States. Potential customers were acquainted with Eldorado's research and development and new product programs. The Company was represented at major conferences in Toronto, Geneva and San Francisco, and exhibited products at the Atomfair in San Francisco.

Research and Development

The year 1964 was the second year of a three-year program for new product development and several of the research projects were carried to the plant develop-

ment stage. Emphasis is now being placed on the plant scale development of processes for the recovery of cobalt and the production of zirconium metal.

The raw material for the cobalt recovery program consisted of ores, concentrates and speiss from the Cobalt district of Ontario and residues from the Port Hope refinery. Although tests have proved that cobalt, silver, nickel and arsenic can be recovered from the complex feed materials, some problems must be overcome before the process reaches the production stage.

High priority was again directed towards the development of a fully integrated nuclear grade zirconium metal industry. The raw material, a hafnium-free hydrated zirconium oxide, has been processed through plant facilities to the ingot stage. Acceptable yields have been attained in most cases and metal quality achieved was close to specifications. The oxygen content of the metal remains slightly higher than desired, but recent tests have indicated that required standards can be met.

Research continued on the recovery of molybdenum metal from the oxide. Saleable lots of barium titanate were also produced.

Research at the Beaverlodge milling operation continued with emphasis on improving the grade and specifications of mine concentrates. Tests carried out during the year have resulted in lower carbonate, ionium and vanadium content in the mill concentrates. Solvent extraction tests on acid leach slurries and recovery of uranium from mine waters have reached the stage where pilot plant development is warranted.

Eldorado continued to support the Mines Branch program on uranium-steel. Research grants to several universities were again provided during 1964.

Ore Procurement

Sales of Canadian uranium continued to follow the downward trend of the past four years. Volume of sales at 11,259,229 pounds U_3O_8 was 26 per cent below 1963 sales of 15,216,812 pounds. Value of sales at \$76,298,692 was 45 per cent below the 1963 value of \$139,900,174.

As of December 31, 1964, six per cent of the earlier contracts and 54 per cent of the 12,000-ton United Kingdom contract remained to be delivered over the period 1965-1971.

Deliveries under the Government stockpiling program were completed during the year with the result that the number of active Canadian producing mines was reduced from seven to four.

Due to the depletion of ore reserves, Gunnar Mining Limited was unable to fulfil its contract with Eldorado. Accordingly, upon instructions from the Government, Eldorado invited proposals by the uranium producers in the Elliot Lake and Bancroft areas for supplying the 1,200,000 pounds U_3O_8 shortfall. The contract was to be awarded to the company which would undertake to provide the greatest number of man-days' employment in the production of the above quantity and such additional quantity as it might wish to produce for its own requirements. Denison Mines Limited was awarded the contract.

Organization and Personnel

The total number of employees at the end of 1964 was 790, a small increase over the total of 776 at the previous year-end. Total wages and salaries paid during 1964 amounted to \$5,590,053, compared with a total payroll of \$5,669,325 in 1963. Company contributions to the Pension, Employee Group Insurance and Welfare plans during the year totalled \$335,993, as against \$326,369 for 1963.

The composition and distribution of the work force at the year-end were as follows:

	Hourly- rated Employees	Salaried Employees	Totals	
			1964	1963
Beaverlodge Operation	404	138	542	531
Port Hope Refinery	97	52	149	145
Research & Development	4	59	63	64
Edmonton Office	—	8	8	8
Head Office	—	28	28	28
Totals	505	285	790	776

Northern Transportation Company Limited

Increases in revenue, profit and tonnage handled were realized during 1964, despite difficult conditions in the Arctic and Colville River areas, and higher maintenance costs. Net profit after taxes increased to \$518,000 from \$271,000 in 1963.

This greater profit was earned as a result of a nine per cent increase in freight revenue and a slight decline in expenses due to lower depreciation charges. Tonnage carried increased seven per cent to a total of 127,903 tons. Freight revenue of \$3,075,000 was \$265,000 greater than in 1963. After providing \$472,000 for income taxes,

the net profit for the year was \$518,000 as compared with \$271,000, after income taxes of \$439,000.

Since 1952, when the Company first became liable under the provisions of the Income Tax Act, federal income taxes have amounted to \$3,407,000. Grants to municipalities in lieu of property taxes have aggregated \$306,500 over the years. The Company pays sales tax and other indirect taxes on the same basis as any other company.

Most of the increase in revenue resulted from tonnage carried to the Colville River area and to potential oil-bearing areas in the Mackenzie Basin where intensified drilling activity is taking place. Short haul revenues from Waterways to the Athabasca tar sands development were significant in 1964.

Extreme ice and wind conditions in the Arctic were experienced during the season, and Sealift vessels assisted in the delivery of a considerable quantity of our Arctic freight. Next season, a new and specially-designed vessel, now under construction on the West Coast, will be added to the Company's fleet and will help provide an improved service in the Western Arctic.

At the peak of the 1964 season the total work force numbered 450, of whom 150 were engaged in the Arctic operation serving the DEW Line. Wages and salaries, including the Arctic operation, totalled \$1,693,112. Company contributions to the Pension and Welfare plans amounted to \$81,249.

Eldorado Aviation Limited

Company aircraft flew more miles but carried less tonnage in 1964 than in 1963. Ton-miles flown totalled 2,346,108 compared with 2,751,639 in 1963. Total cost of operating the three transport aircraft was \$668,271 as compared with \$589,107 last year.

The DC-4 was out of operation for major overhaul from December, 1963 to April, 1964, but a satisfactory service was maintained by the Company's two DC-3's. The enforced use of the smaller aircraft contributed to higher operating costs. Two Bell helicopters serviced Northern Transportation Company's Arctic operations, and a third was in service between Beaverlodge and the Waterloo Lake hydro power site. The Sikorsky S-55 was not in regular use but was maintained on a stand-by basis for emergency purposes.

The staff comprised 34 persons at the year-end. The 1964 total of wages and salaries paid was \$257,062, and the total of Company contributions to the Pension and Welfare plans amounted to \$23,157.

ELDORADO MINING AND REFINING LIMITED

Statement of Income and Expense

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

	1964	1963
INCOME:		
Sales	\$ 15,690,356	\$ 24,280,962
EXPENSE:		
Mining, milling and refining	5,175,437	11,044,151
Depreciation	4,103,015	4,162,435
Amortization of cost of acquiring rights to deliver concentrates on cancellation of contract with another producer	3,121,382	3,468,113
Amortization of pre-production, mine development and other deferred expenditures	410,772	806,429
Scientific research	1,179,651	936,206
Grants in lieu of municipal taxes	360,598	277,658
Reduction in valuation of inventories	—	224,000
Sales expense	153,701	148,286
	<u>14,504,556</u>	<u>21,067,278</u>
NET INCOME FROM OPERATIONS	1,185,800	3,213,684
Income arising from the financing of ore procurement programme	2,974,085	1,254,629
Interest and other non-operating income (net)	690,605	1,214,575
	<u>4,850,490</u>	<u>5,682,888</u>
Provision for income tax	2,400,000	2,900,000
NET INCOME:	<u>\$ 2,450,490</u>	<u>\$ 2,782,888</u>

The accompanying notes are an integral part of the financial statements. (See page 12).

Eldorado Mining and Refining Limited

(Incorporated under the laws of the Republic of South Africa)

BALANCE SHEET

at December 31, 1963

(with comparative figures for 1962)

ASSETS	1964	1963
CURRENT ASSETS:		
Cash	\$ 465,265	\$ 244,387
Deposit with Receiver General	13,200,000	13,200,000
Treasury bills and short-term bank deposits	1,696,561	6,307,440
Accounts receivable	8,169,147	3,309,361
Advances in respect of concentrates to be received	7,935,886	244,685
Concentrates and refinery products valued at lower of cost or realizable value	14,622,640	12,998,342
Operating and general supplies, at cost	2,434,999	2,752,666
Prepaid expenses	182,619	184,268
	<u>48,707,117</u>	<u>39,241,149</u>
Advances in respect of concentrates to be received in later years	36,847,711	34,990,918
Deferred account receivable in respect of concentrates delivered (Note 1)	25,422,502	20,879,580
	<u>62,270,213</u>	<u>55,870,498</u>
INVESTMENTS AND LOANS:		
Investments in wholly-owned subsidiary companies, at cost	187,153	187,153
Employees' housing loans	290,950	327,676
Municipal Corporation of Uranium City and District 5% debentures, maturing 1975 to 1979	827,305	871,973
	<u>1,305,408</u>	<u>1,386,802</u>
DEFERRED CHARGES:		
Unamortized pre-production, mine development and other expenditures		410,772
Unamortized cost of acquiring rights to deliver concentrates on cancellation of contract with another producer		3,121,382
		<u>3,532,154</u>
Excess of costs and expenses over sales of concentrates procured from other producers, recoverable before completion of contracts (Note 2)	<u>241,811</u>	<u>2,989,607</u>
CAPITAL ASSETS:		
Property, plant and equipment, at cost	51,699,102	50,329,305
Less: Accumulated depreciation	51,016,397	47,128,492
	<u>682,705</u>	<u>3,200,813</u>
	<u>\$ 113,207,254</u>	<u>\$ 106,221,023</u>

The accompanying notes are an integral part of the financial statements. (See page 12)

Approved on behalf of the Board

J. E. SYDIE,
Director.

FRED R. HADLEY,
Director.

Oil Refining Limited

(Incorporated under the Companies Act)

BALANCE SHEET

as at December 31, 1964

(as at December 31, 1963)

LIABILITIES	1964	1963
CURRENT LIABILITIES:		
Accounts payable	\$ 2,813,919	\$ 5,390,954
Provision for income tax	1,144,357	1,721,400
Advance payments in respect of concentrates and other products to be delivered	19,557,260	9,943,593
	<u>23,515,536</u>	<u>17,055,947</u>
Advance payments in respect of concentrates to be delivered in later years	<u>37,690,274</u>	<u>38,114,122</u>
CAPITAL:		
Capital Stock:		
Authorized — 110,000 shares of no par value		
Issued — 70,500 shares, fully paid	6,586,080	6,586,080
Surplus	45,415,364	44,464,874
	<u>52,001,444</u>	<u>51,050,954</u>
	<u>\$ 113,207,254</u>	<u>\$ 106,221,023</u>

I have examined the above Balance Sheet and the related Statement of Income and Expense and have reported thereon under date of February 24, 1965 to the Minister of Trade and Commerce.

A. M. HENDERSON,
Auditor General of Canada

Eldorado Mining and Refining Limited

Notes to Financial Statements

1. Deferred Account Receivable

The contract with the United Kingdom Atomic Energy Authority for the sale of 12,000 tons of uranium in concentrates provides for certain deliveries on which payments do not become due until later years of the contract period. The account thus deferred amounting to \$25,422,502 is expected to reach a maximum of \$25,776,000 in 1965 and will be recovered during the years 1971-73 in equal annual instalments.

2. Excess of Costs and Expenses over Sales of Concentrates procured from other Producers

At December 31, 1963 the excess of costs and expenses over sales of concentrates procured from other producers amounted to \$2,989,607. During the year under review there was an excess of sales over costs and expenses of \$2,747,796 leaving a balance at December 31, 1964 of \$241,811 to be offset in 1965 when deliveries will be made at prices exceeding the costs of acquisition.

3. Claims

Claims aggregating approximately \$20,000,000 have been received by the company in respect of alleged breaches of contract. Officers and legal counsel of the company deny any liability whatsoever under these claims.

4. Government of Canada Stockpile Programme

During 1963 the Treasury Board with the approval of the Governor in Council, granted authority for the entry into contracts between Her Majesty the Queen, in right of Canada, acting and represented by Eldorado Mining and Refining Limited, and certain Canadian uranium producers for the purchase by Her Majesty of uranium bearing concentrates.

At December 31, 1964 the company was the custodian of uranium concentrates to a total cost of \$24,407,919 thus acquired. The cost of these concentrates was charged to the Department of Trade and Commerce appropriations and was not included in the accounts of the company.

5. Supplementary Information

Included in expenses for 1964 are: directors' fees, \$6,000; legal fees, \$9,250; and remuneration of executive officers, \$144,900.

ELDORADO MINING AND REFINING LIMITED

Statement of Sales and Costs of Uranium Concentrates procured from other Producers

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

	1964	1963
Sales under contract with:		
United States Atomic Energy Commission	\$ 23,045,239	\$ 80,880,570
United Kingdom Atomic Energy Authority	38,982,293	37,726,921
	62,027,532	118,607,491
Costs of concentrates sold	56,267,284	118,487,027
Excess of Sales over Costs	5,760,248	120,464
Administrative expenses	38,367	67,075
Financial charges	2,974,085	1,254,629
	3,012,452	1,321,704
Excess of sales over costs and expenses of concentrates procured from other pro- ducers (Note 2)	\$ 2,747,796	\$ (1,201,240)

The accompanying notes are an integral part of the financial statements.

ELDORADO MINING AND REFINING LIMITED

Statement of Surplus

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

	1964	1963
Balance at beginning of year	\$ 44,464,874	\$ 43,681,986
Net profit for year	2,450,490	2,782,888
	46,915,364	46,464,874
Dividend	1,500,000	2,000,000
Balance at end of year	\$ 45,415,364	\$ 44,464,874

AUDITOR GENERAL OF CANADA

Ottawa, February 24, 1965

The Honourable MITCHELL SHARP,
Minister of Trade and Commerce,
Ottawa.

SIR,

I have examined the accounts and financial statements of Eldorado Mining and Refining Limited for the year ended December 31, 1964. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- a) proper books of account have been kept by the company;
- b) the financial statements of the company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of income and expense, give a true and fair view of the income and expense of the company for the financial year; and
- c) the transactions of the company that have come under my notice have been within the powers of the company under the Financial Administration Act and any other Act applicable to the company.

In accordance with the requirements of Section 118 of the Companies Act, R.S. 1952, I report that the profit for the year of Northern Transportation Company Limited, a wholly-owned subsidiary, has not been included in the accounts of Eldorado Mining and Refining Limited. The net expenses of Eldorado Aviation Limited, another wholly-owned subsidiary, were recovered from Eldorado Mining and Refining Limited and Northern Transportation Company Limited as at December 31, 1964.

Yours faithfully,

A. M. HENDERSON.

Auditor General of Canada.

NORTHERN TRANSPORTATION COMPANY LIMITED

(Incorporated under the Companies Act)

Balance Sheet

at December 31, 1964

(with comparative figures at December 31, 1963)

ASSETS

	1964	1963
CURRENT ASSETS:		
Cash	\$ 293,559	\$ 254,312
Short-term bank deposits ..	3,250,000	3,200,000
Accounts receivable	491,765	348,769
Operating and general supplies, at cost	349,772	338,169
Prepaid expenses	9,842	19,230
	<u>4,394,938</u>	<u>4,160,480</u>
Short-term Deposits held for Insurance Investment Fund	1,250,000	1,250,000
CAPITAL ASSETS, at cost:		
Land	98,467	89,442
Buildings, including equipment	2,366,823	2,310,676
Boats and barges, including equipment	9,915,880	9,470,132
Automotive equipment	1,084,499	1,043,988
Other	115,451	103,354
	<u>13,581,120</u>	<u>13,017,592</u>
Less: Accumulated depreciation	11,809,190	11,533,938
	<u>1,771,930</u>	<u>1,483,654</u>
	<u>\$ 7,416,868</u>	<u>\$ 6,894,134</u>

LIABILITIES

	1964	1963
CURRENT LIABILITIES:		
Accounts payable	\$ 256,579	\$ 234,608
Provision for income tax ..	211,689	228,720
	<u>468,268</u>	<u>463,328</u>
CAPITAL:		
Capital Stock:		
Authorized—50,000 shares of no par value		
Issued—1,520 shares, fully paid	152,000	152,000
Reserve for insurance	1,250,000	1,250,000
Surplus	5,546,600	5,028,806
	<u>6,948,600</u>	<u>6,430,806</u>
	<u>\$ 7,416,868</u>	<u>\$ 6,894,134</u>

Approved on behalf of the Board

W. M. GILCHRIST,
Director.

H. E. LAKE,
Director.

I have examined the above Balance Sheet and the related Statement of Income and Expense and have reported thereon under date of February 22, 1965 to the Minister of Trade and Commerce.

A. M. HENDERSON,
Auditor General of Canada.

NORTHERN TRANSPORTATION COMPANY LIMITED

Statement of Income and Expense

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

INCOME	1964	1963
Freight earnings	\$ 3,074,562	\$ 2,809,322
EXPENSE		
Operations and maintenance:		
Salaries and wages	870,881	781,979
Repairs and maintenance	411,394	324,718
Depreciation	221,789	479,172
Fuels and lubricants	179,267	160,730
Messing expense	136,406	129,261
Truck and tractor maintenance	35,126	24,359
Transportation of employees	31,670	24,243
Grants in lieu of municipal taxes	24,896	23,464
Pallet expense	20,338	14,108
Switching, demurrage and spur expense	13,128	13,057
Wharfage	12,789	5,443
Insurance	9,477	19,656
Miscellaneous	22,980	26,842
	<u>1,990,141</u>	<u>2,027,032</u>
Administrative:		
Executive officers' salaries	43,261	43,287
Other salaries	72,819	72,817
Contributions to employees' pension plan	48,115	47,874
Depreciation	12,372	10,789
Miscellaneous (including directors' fees, \$690)	88,606	69,981
	<u>265,173</u>	<u>244,748</u>
	<u>2,255,314</u>	<u>2,271,780</u>
NET INCOME FROM OPERATIONS	819,248	537,542
Interest from investments	168,490	164,747
Profit on disposal of capital assets	1,745	7,921
	<u>989,483</u>	<u>710,210</u>
Provision for income tax	471,689	438,720
NET INCOME	<u>\$ 517,794</u>	<u>\$ 271,490</u>

NORTHERN TRANSPORTATION COMPANY LIMITED

Statement of Surplus

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

	1964	1963
Balance at beginning of year	\$ 5,028,806	\$ 4,757,316
Net income for year	<u>517,794</u>	<u>271,490</u>
Balance at end of year	<u>\$ 5,546,600</u>	<u>\$ 5,028,806</u>

AUDITOR GENERAL OF CANADA

Ottawa, February 22, 1965

The Honourable MITCHELL SHARP,
Minister of Trade and Commerce,
Ottawa.

SIR,

I have examined the accounts and financial statements of Northern Transportation Company Limited for the year ended December 31, 1964. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- a) proper books of account have been kept by the company;
- b) the financial statements of the company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of income and expense, give a true and fair view of the income and expense of the company for the financial year; and
- c) the transactions of the company that have come under my notice have been within the powers of the company under the Financial Administration Act and any other Act applicable to the company.

Yours faithfully,

A. M. HENDERSON.

Auditor General of Canada.

ELDORADO AVIATION LIMITED

(Incorporated under the Companies Act)

Balance Sheet

at December 31, 1964

(with comparative figures for the year ended December 31, 1963)

ASSETS			
	1964	1963	
CURRENT ASSETS:			
Cash	\$ 42,141	\$ 35,227	
Accounts receivable:			
Eldorado Mining and Refining Limited ...	15,809	61,758	
Northern Transportation Company Limited ..	1,734	7,555	
Other	7,262	1,074	
	<u>24,805</u>	<u>70,387</u>	
Operating supplies, at cost.	59,273	63,458	
Prepaid insurance	9,146	16,344	
	<u>135,365</u>	<u>185,416</u>	
CAPITAL ASSETS, at cost:			
Aircraft, including major spare parts	994,478	945,018	
Shop, hanger and loading equipment, etc.	35,127	34,508	
Office furniture and equipment	7,873	7,873	
	<u>1,037,478</u>	<u>987,399</u>	
Less: Accumulated depreciation	882,711	823,185	
	<u>154,767</u>	<u>164,214</u>	
	<u>\$ 290,132</u>	<u>\$ 349,630</u>	

LIABILITIES			
	1964	1963	
CURRENT LIABILITIES:			
Accounts payable:			
Trade	\$ 34,443	\$ 93,941	
	<u>34,443</u>	<u>93,941</u>	
CAPITAL:			
Capital Stock:			
Authorized—50,000 shares of \$1 each			
Issued—28,006 shares, fully paid	28,006	28,006	
Reserve for uninsured losses	—	100,000	
Surplus	227,683	127,683	
	<u>255,689</u>	<u>255,689</u>	
	<u>\$ 290,132</u>	<u>\$ 349,630</u>	

Approved on behalf of the Board

A. B. CAYWOOD,
Director.

H. E. LAKE,
Director.

I have examined the above Balance Sheet and the related Statement of Recoverable Expenses and have reported thereon under date of February 24, 1965 to the Minister of Trade and Commerce.

A. M. HENDERSON,
Auditor General of Canada.

ELDORADO AVIATION LIMITED

Statement of Recoverable Expenses

for the year ended December 31, 1964

(with comparative figures for the year ended December 31, 1963)

	1964	1963
Salaries, wages and contributions to employees' pension plan	\$ 231,418	\$ 186,999
Repairs	173,021	166,784
Supplies	150,014	153,359
Depreciation	62,144	48,953
Hangar expense	52,788	44,159
Insurance	36,113	35,156
Landing fees and radio maintenance	11,996	14,508
Travel	2,202	4,019
Miscellaneous	20,083	22,649
	<u>739,779</u>	<u>676,586</u>
Less: Miscellaneous income	22,430	5,098
Net Expenses	<u>\$ 717,349</u>	<u>\$ 671,488</u>

Note: The above net expenses were recovered from:

Eldorado Mining and Refining Limited	\$ 543,755	\$ 533,417
Northern Transportation Company Limited ..	173,594	138,071
	<u>\$ 717,349</u>	<u>\$ 671,488</u>

AUDITOR GENERAL OF CANADA

Ottawa, February 24, 1965

The Honourable MITCHELL SHARP,
Minister of Trade and Commerce,
Ottawa.

SIR,

I have examined the accounts and financial statements of Eldorado Aviation Limited for the year ended December 31, 1964. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- a) proper books of account have been kept by the company;
- b) the financial statements of the company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of recoverable expenses, give a true and fair view of the expenses of the company for the financial year;
- c) the transactions of the company that have come under my notice have been within the powers of the company under the Financial Administration Act and any other Act applicable to the company.

Yours faithfully,

A. M. HENDERSON.
Auditor General of Canada.

The History of Eldorado and its Subsidiary Companies

The true beginning lay in a few sentences of a Government report, written in 1900, which occasioned so little interest that it gathered dust in the files for at least a quarter-century.

Long before the airplane and the helicopter had been thought of, the Geographical Survey of Canada sent interpid geologists to scour the virtually unexplored Northwest Territories, on foot and by canoe, in an effort to determine some of its mineral potentials. One of these geologists, J. Macintosh Bell, concentrated his search along the shores of Great Bear Lake. This 12,000-square-mile body of fresh water, much larger than either Lake Ontario or Lake Erie, lies east of the Mackenzie River and is partly within, although mainly below, the Arctic Circle.

The geologist reported that he had found "rock stained with cobalt bloom and copper green" on the eastern shore of the lake. He added, almost as an after-thought, that there might be deposits of pitchblende, the mother ore of radium and uranium.

Stirred Little Interest

In 1900 radium and uranium were still laboratory curiosities. A German chemist, Klaproth, had discovered the element uranium, as well as zirconium and titanium, in 1789. More than a century later Henri Becquerel of France published his observations of the radio-activity of uranium, pointing the way for the Curies, who discovered radium and its transformation product, polonium, in 1898.

Applications in medical therapy, and in some industrial uses such as luminous paint, gradually created a demand for radium. The Shinkolobwe mine in the Belgian Congo had a virtual world monopoly and at one time a single gram of the element was worth \$70,000 or more.

On the other hand, there was relatively small demand for uranium. Some of the compounds were used in the arts and industry as coloring materials for ceramics, as chemical reagents, and in a variety of alloys, but the

quantities involved were not great. It is of interest that a patent was issued in France as early as 1897 for an alloy of uranium with steel. In World War I the Germans lined the barrel of "Big Bertha" with uranium steel. The giant railway gun was used to hurl scores of 200-pound shells into Paris from an incredible range of 75 to 80 miles.

The Port Radium Discovery

Late in the 1920's Eldorado Gold Mining Limited decided to undertake aerial prospecting in the Far North, and preliminary studies brought the Bell report to light. A search along the eastern shore of Great Bear Lake confirmed not only indications of silver and cobalt, but the presence of pitchblende in substantial quantities. Claims were staked and development of the mine was begun as quickly as equipment could be brought in, virtually all of it by air-lift in the relatively small aircraft available at the time. Initially, mining operations were directed mainly towards the silver, cobalt and gold values in the ore, but it was soon apparent the real wealth of the mine lay in the pitchblende.

A small refinery was established at Port Hope, Ontario, almost 3,000 miles from the mine itself. Shipping of concentrates by air, water and rail began in 1932. The refinery made its first shipment of Canadian-produced radium in 1933. In November, 1936, it completed production of its first ounce (28 grams) of radium, and by 1938 a monthly output of 2.5 grams was reported. The actual product of the refinery was radium bromide of 90 per cent purity, which was shipped to England for accurate determination of radio-active content, final refinement, and preparation into usable form.

Even though the amounts involved seem relatively minute, the rising Canadian production broke the Belgian monopoly and the price of radium dropped rapidly. In 1940 demand had diminished, substantial inventories were on hand, and Eldorado closed the Port Radium mine.

Concurrent with the production of radium through the 1930's, Eldorado had sold substantial quantities of silver from the mine and had developed a small market for such uranium salts as yellow and orange sodium uranate and black oxide, mainly for use in the coloring of glass and ceramics. The price of these salts ranged from \$2.50 to \$2.92 per pound in 1938.

First Atomic Use of Uranium

An urgent need for uranium in quantity arose with the inception in 1942 of the Manhattan Project, the joint British-United States-Canadian undertaking which eventually brought forth the atomic bomb. Canada's

What Uranium Has Meant to Canada

Sales of uranium to the United States and the United Kingdom in the period 1955-64 inclusive brought an average of \$165,000,000 annually into the Canadian economy. By the time deliveries have been completed under existing contracts, the total value of sales will be close to \$1,750,000,000.

chief role was to supply the uranium raw material, and the Government requested the re-opening of the Port Radium mine on an emergent basis, but with no hint as to the reason. The mine and mill, as well as the Port Hope refinery, were in full operation by early 1943. Shipments of uranium were made, but it is believed the actual material used for the first atomic bomb was not of Canadian origin.

In June, 1943, the Company name was changed from Eldorado Gold Mines Limited to Eldorado Mining and Refining Limited. Late in that year, when it became evident the atomic bomb would be feasible, the three governments concerned decided that they should at once gain complete control of uranium resources within their respective territories. On January 28, 1944, Eldorado was expropriated and the operation was taken over by the Crown-owned Eldorado Mining and Refining (1944) Limited. Northern Transportation Company Limited was taken over at the same time.

The Port Radium mine was exceedingly rich, but eventually its ore gave out and it ceased operations and was placed on a caretaker basis in September, 1960. Meanwhile, Eldorado prospectors had found important ore deposits in the Lake Athabaska region, leading to development of the Beaverlodge mine which went into production in 1953.

The Boom Years for Uranium

Eldorado was the sole producer of uranium in Canada until cold war demands created new and urgent demands which led to the discovery and development of further deposits of ore, especially in the Blind River (Elliot Lake) and Bancroft areas of Ontario and the Beaverlodge region of Northwestern Saskatchewan. By 1958 there were 25 producing mines in Canada, and the peak production of almost 31,000,000 pounds of U_3O_8 was attained the following year.

The amount of uranium provided by Eldorado for military purposes during World War II and up to incorporation of the Crown corporation in 1944 is still classified information. However, the Company's revenue from 1944 to the end of 1954, from the sale of uranium and from some sales and rentals of radium, was about \$82,000,000. Its income from uranium sales in the period 1955-64 inclusive was \$248,550,000 and, in the same term, its revenue from operation of the refinery amounted to \$34,584,000. The Company's aggregate income from 1944 to the end of 1964 was just over \$365,000,000, representing a little better than one dollar of every five Canada has earned to date from the sale of uranium.

The Government's original investment in acquiring ownership of Eldorado Mining and Refining Limited was \$9,246,877, from which it has derived a return of \$32,240,000 in dividends and redemption of shares. From 1944 to date the Company has paid, or provided for, in federal taxes, provincial royalties, and grants in lieu of municipal taxes, a total of \$36,120,000. The net

worth of the Company at the end of 1964 was about \$52,000,000.

Eldorado has two wholly-owned subsidiaries, Northern Transportation Company Limited and Eldorado Aviation Limited.

Northern Transportation Company

In 1931 two Edmonton businessmen, C. Becker and C. Murdoff, set up Northern Waterways Limited as a common carrier between Waterways, Alberta, and Akla-vik, N.W.T., with initial equipment of one wooden vessel and two barges. In 1933 service was extended into Bear River and Great Bear Lake to meet the needs of the Port Radium mine. The company changed hands in 1934 and the name was changed to Northern Transportation Company Limited.

Eldorado Gold Mines Limited acquired Northern Transportation Company Limited in 1936, primarily to assure continuing and adequate service to its mine, but operation as a common carrier also was maintained. The fleet was enlarged and modernized.

Initiation of the Canol Project in 1941, and re-opening of the Port Radium mine in 1942, brought all Northern Transportation Co. equipment into service for the duration of the war. When the Canol Project was abandoned in 1944, NTCL contracted to bring out 25,000 tons of equipment and materials.

In 1946 all transportation on the Mackenzie system was brought under Board of Transport Commissioners' regulations. When Hudson's Bay Transport discontinued operations as a common carrier at the end of the 1947 season, NTCL added vessels to handle the additional freight. In 1949, at the request of the R.C.A.F., NTCL operated the "Snowbird" between Tuktoyaktuk and Cambridge Bay in the Western Arctic.

Serving DEW Line in Arctic

The Radium Dew and three steel barges were built especially for delivery of construction materials and equipment for six DEW Line sites in the Mackenzie Delta, beginning in 1955. In 1958 Northern Transportation began re-supply of 25 DEW Line sites along the Arctic Coast, operating LST's and tankers made available under a loan agreement between the United States and Canadian governments.

When uranium mines around Lake Athabaska were coming into the development and production stage in 1956, NTCL bought three new vessels and 27 steel barges to take care of the heavy increase of freight. Some of this equipment "went into mothballs" in 1960 when freight volume declined because of the cut-back in uranium production. Five mines in the Beaverlodge region, as well as the Port Radium mine on Great Bear Lake, were shut down in that year.

In 1963, at the request of The Hudson's Bay Company, NTCL took over the Arctic freight service formerly pro-

Canada's Uranium Sales 1955 - 1964

to the United States Atomic Energy Commission and
the United Kingdom Atomic Energy Authority

POUNDS U₃O₈ SOLD

DOLLAR VALUE OF SALES

	<i>Industry Total</i>	<i>Eldorado</i>	<i>Other Producers</i>	<i>Total</i>
1955	2,030,767	\$ 23,687,582	\$ 1,190,547	\$ 24,878,129
1956	4,223,704	21,511,508	20,785,781	42,297,289
1957	12,152,916	26,554,646	98,985,240	125,539,886
1958	26,796,084	33,010,520	246,904,045	279,914,565
1959	30,996,065	29,998,052	295,330,230	325,328,282
1960	24,960,435	31,720,083	234,037,824	265,757,907
1961	19,270,884	24,786,036	177,544,698	202,330,734
1962	17,080,037	21,718,388	151,964,007	173,682,395
1963	15,216,812	21,292,683	118,607,491	139,900,174
1964	11,259,229	14,271,161	62,027,531	76,298,692
	<u>163,986,933</u>	<u>\$248,550,659</u>	<u>\$1,407,377,394</u>	<u>\$1,655,928,053</u>

vided by that organization. The Company also acquired the "Banksland" motor vessel. In 1964, in order to meet the requirements of the Arctic service, the Company commissioned a second vessel the "Frank Broderick" which is now under construction and scheduled for delivery in time for the 1965 navigation season.

Northern A Tax-payer, Too

Although under Crown ownership, Northern Transportation operates under the same regulations and pays the same taxes as private companies. It has shown a net profit after tax in 18 of the 20 years since it was acquired by the Crown (as a wholly-owned subsidiary of Eldorado), and other than for initial capital investment when it was taken over, has paid for the expansion of its facilities out of its own earnings.

Federal taxes paid by NTCL, or provided for, since 1952, when it first became liable under the provisions of the Income Tax Act, have amounted to \$3,407,000. Grants in lieu of municipal taxes have aggregated \$306,500.

When the Company was acquired by the Crown in 1944, its fleet of wooden tugs and barges was bought at a cost of \$140,000. Today the Company has 25 Diesel-powered steel tugs and 98 steel barges, which, together with shipyards, agency facilities and equipment, represent an investment of more than \$12,500,000.

NTCL serves an area extending from railhead at Waterways, Alberta, to Tuktoyaktuk on the Arctic Coast, a distance of 1,700 miles, with an additional 1,100 miles of branch routes to the principal lakes, Athabaska, Great Slave and Great Bear. In addition, NTCL operates a freight service in the Western Arctic and is the Government agency responsible for re-supply of the DEW Line radar stations.

Eldorado Aviation

The remoteness of the Port Radium mine made air transportation essential from the earliest stages. In 1944 Eldorado acquired its own aircraft to assist in field exploration work and the movement of personnel, perishable goods and emergency supplies. The service was expanded and a regular schedule established with the inception of the Beaverlodge mine, and in 1953 the division was incorporated as a separate, wholly-owned subsidiary company, Eldorado Aviation Limited. It provides air service at cost for Eldorado and Northern Transportation Company Limited. In addition to the movement of personnel and supplies, the aircraft carry uranium concentrates out of Beaverlodge.

From the formation of Eldorado Aviation in May, 1944, until the end of 1964, its aircraft had flown more than 13,280,000 miles, in excess of 67,500 flying hours, and had carried more than 74,700 tons of freight and 103,800 passengers.

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